IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Lee D. Saathoff et al.
Application No.:	10/788,732
Filing Date:	February 27, 2004
Confirmation No.:	6113
Title:	POWER TRANSMISSION FLUIDS
Examiner:	James C. Goloboy
Group Art Unit:	1797

DECLARATION OF LEE D. SAATHOFF

Mail Stop AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Lee D. Saathoff, hereby declare as follows:

1. I am presently employed by Afton Chemical Corporation, Richmond, Virginia, as an Engineering Specialist. I have over 5 years of experience in the area of transmission lubricant research with Afton Chemical Corporation (formerly Ethyl Corporation). Prior to my employment with Afton Chemical in Driveline Lubricants, I have an additional 30 years at Afton Chemical Corporation.

2. I graduated from Southern Illinois University in Edwardsville, Illinois in 1989 with a Bachelor of Science degree in Electrical Engineering.

3. I am the author, or co-author, of 2 papers in reviewed Journals, relating to gear and transmission lubricants, and am an inventor on 2 U.S. Patents.

4. I am a named inventor of U.S. Application No. 10/788,732. I have read the specification and claims and am familiar with the application.

5. We have surprisingly found that a tertiary amine where R_1 comprises an alkyl or alkenyl group having about 1 to 4 carbon atoms and R_2 and R_3 independently comprise one of an alkyl, an alkenyl, an alkynyl, an alkylthioalkyl, a haloalkyl, and a haloalkenyl group having from about 8 to 30 carbon atoms provides significant advantages over other tertiary amines when utilized in a power transmission fluid. For

example, it has surprisingly been found that the presently claimed transmission fluids can be used to control friction properties for longer periods of time than transmission fluids containing other tertiary amines.

In addition to the data submitted in the Declarations signed August 7, 2009 and April 1, 2010, we conducted additional testing on eight fluids to demonstrate improved performance over the claimed wt% range and carbon range of the tertiary amine. The data is included and explained below.

Eight transmission fluid formulations were tested in the LFW-1 friction test (explained in detail at page 15 of the present specification). Two comparative example fluids (Ex. 1 and 2) containing a tertiary amine having two methyl (C1) groups and one octadecyl (C18) group were tested in an amount of 1 and 5 wt% of the tertiary amine. Six inventive fluids (Ex. 3 - 8) were also tested each in an amount of 1 and 5 wt% of the tertiary amine. Examples 3 and 4 contained a tertiary amine having one methyl (C1) group and two octyl (C8) groups. Examples 5 and 6 contained a tertiary amine having one methyl (C1) group and two decyl (C10) groups. Examples 7 and 8 contained a tertiary amine having one methyl (C1) group and two octadecyl (C18) groups. The test sample formulations and test results are disclosed in the tables below:

Test Samples	Ex. 1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	Ex. 6	Ex. 7	Ex. 8
Tertiary Amine R1 & R2= C1 R3 = C18	1.0	5.0						
Tertiary Amine R1 = C1 R2 & R3 = C8			1.0	5.0				
Tertiary Amine R1 = C1 R2 & R3 = C10					1.0	5.0		
Tertiary Amine R1 = C1 R2 & R3 = C18							1.0	5.0
Dispersant ~950 MW PIB based dispersant[1]	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Base Oil Yubase 4[2]	89.60	85.60	89.60	85.60	89.60	85.60	89.60	85.60
Other Typical Transmission Fluid Additives	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance

[1] ~950 molecular weight polyisobutylene based dispersant having no boron or phosphorus.
[2] Yubase 4 is a group II/III base stock with viscosity of about 4.2 cSt at 100 °C

Test Results	Ex. 1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	Ex. 6	Ex. 7	Ex. 8
New								
Static coef	0.1977	0.1879	0.2168	0.2056	0.2122	0.2106	0.2085	0.2080
Dynamic coef	0.1827	0.1746	0.1915	0.1806	0.1749	0.1731	0.1764	0.1756
Static/Dynamic	1.0821	1.0764	1.1322	1.1382	1.2129	1.2167	1.1820	1.1848
Init max pt	0.2004	0.1899	0.2206	0.2093	0.2180	0.2165	0.2132	0.2131

Final max pt	0.2014	0.1911	0.2218	0.2099	0.2197	0.2180	0.2149	0.2150
Aged 108hrs at 170°C								
Static coef	0.1846	0.1687	0.1927	0.2023	0.2075	0.1986	0.1999	0.1779
Dynamic coef	0.1720	0.1730	0.1741	0.1784	0.1790	0.1726	0.1742	0.1707
Static/Dynamic	1.0734	0.9751	1.1070	1.1338	1.1589	1.1507	1.1478	1.0424
Init max pt	0.1870	0.1734	0.1949	0.2053	0.2127	0.2027	0.2040	0.1808
Final max pt	0.1882	0.1746	0.1954	0.2064	0.2127	0.2030	0.2045	0.1813

The formulations were each tested before aging and after aging, identified as "New" and "Aged" in the Results Table. Measurements of friction characteristics were taken at the start of the test when the ring was stationary and as the ring gradually accelerated to its maximum speed (about 0.5 m/s) and as the ring gradually decelerated back to zero.

In order to assess the difference between the tertiary amine including a single methyl group and the tertiary amine including two methyl groups, the ratio of static to dynamic friction was calculated for each run. Each of fluids showed a decrease in friction on aging of oil as demonstrated by a reduction of the static to dynamic ratio.

6. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

01/05/2011
Date

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